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Invited Articles

The Education of Medical Students: Sounds, Alarums, and Excursions, *by Daniel D. Federman, M.D.* 221

An Evolving Agenda for the AAMC's Second Century, *by Louis Sullivan, M.D.* 226

Restructuring Education and Its Impact on Medical Education, *by Lauro F. Cavazos, Ph.D.* 230

Ideas in Medical Education

Using Classic Mystery Stories in Teaching, *by Stephen H. Sheldon, D.O., and Peter A. Noronha, M.D.* 234

Academic Computing in Medicine

Status Report on the NBME's Computer-Based Testing, *by Stephen G. Clyman, M.D., M.S., and Nancy A. Orr, Ph.D.* 235

From the President 242

AAMC Focus 243

National Policy Perspectives 244

Commentary

A Plea for Positive Thinking about Modern American Medicine, *by Ernst Jaffé, M.D.* 246

Research Reports
ARTICLES

Investigating the Fairness of the National Residency Matching Program, *by Yufei Yuan, Ph.D., and Amiram Gafni, D.Sc.* 247

The Reliability of the Proposal Review Process for a Summer Research Fellowship Program, *by Antoinette S. Peters, Ph.D., and Thomas D. Flanagan, Ph.D.* 254

Variation in Lengths of Training among Residents Enrolled in Pediatrics and Internal Medicine Training Programs, *by Robert A. Hoekelman, M.D., and Ruth M. Parker, M.D.* 257

	Surveying Graduates of Combined Internal Medicine–Pediatrics Residency Programs, *by Frank M. Biro, M.D., Matthew W. Gillman, M.D., Ruth M. Parker, M.D., Philip R. Khoury, M.S., and David M. Siegel, M.D.*	266
SHORT PAPERS	Mentors in Graduate Medical Education at the Medical College of Wisconsin, *by Robert A. Kirsling, M.S., and Mahendr S. Kochar, M.D., M.S.*	272
	A New Method of Assessing the Interpersonal Skills of Surgeons, *by Kenneth W. Burchard, M.D., and Pamela A. Rowland-Morin, Ph.D.*	274
AAMC Data Report	Women on Faculties of U.S. Medical Schools, 1978–1989, *by Brooke E. Whiting, Ph.D., and Janet Bickel, M.A.*	277

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RESEARCH REPORTS

ARTICLES

Investigating the Fairness of the National Resident Matching Program

YUFEI YUAN, Ph.D., and AMIRAM GAFNI, D.Sc.

Abstract—The National Resident Matching Program (NRMP) was established in the early 1950s to bring order and fairness to a previously chaotic application process for internship and residency positions. Over the years many reservations were raised about the fairness of the process, specifically, that hospital programs are doing better than students are (i.e., programs obtain preferred residents more often than students receive preferred programs). This paper presents an analysis of the results of the 1986 Match. The findings do not support the claim that the results of the Match are biased in a way that favors programs. Overall, the students' success was greater (i.e., receiving on average higher-ranked choices) than was the hospital programs' success. In fact, in 20 of 22 specialty programs, the students' degree of success was greater than or equal to the success of the programs. This finding raises the question of fairness toward programs rather than students. The authors analyze factors that affected both the hospitals' and the students' degrees of success in the 1986 Match and suggest strategies for improving the Match results. *Acad. Med.* 65(1990):247–253.

The National Resident Matching Program (NRMP) was established in the early 1950s to bring order and fairness to a previously chaotic application process for internship and residency positions.[1,2] In brief, from the turn of the century until 1945, the competition by hospitals for interns and residents manifested itself in a race to sign employment contracts earlier and earlier in medical students' careers. In some cases students were subjected to direct pressure from programs and were forced to decide prematurely. The adoption of a centralized matching mechanism seemed to resolve most of these problems.

The NRMP requires each of the participants (students and hospital program directors) to supply a rank-order list of preferences. Based on these rank-order lists, a computerized algorithm is used to assign the students to hospital positions. The assignment algorithm used is described in general terms in the NRMP directory[3] and is equivalent to the one described by Gale and Shapley.[4] The use of the algorithm provides a "stable solution," namely, the outcome of the matching process is such that after the Match, there exists no student and hospital program (who are not assigned to each other) who would *both* prefer each other to their assigned partners.

In spite of this theoretically stable solution, many reservations were raised during the years about the fairness of the NRMP process. For example, some said that residency program directors understand the Match system better (stemming from past experience resulting from participating in many Matches) and thus are able to receive better students because they know which ones to rank higher[5]; that due to lack of satisfaction with the "official" program (NRMP), "unofficial" arrangements have appeared[6]; that there is dishonesty in some recruitment interviews from program directors[7]; and that the current computer algorithm treats students and programs unequally in a way that favors programs.[8]

Nevertheless, the NRMP has been praised as an equitable system of residency matching. Some proponents insist that it is a far fairer system than the routine admission-rejection system used by colleges, medical schools, or other schools.[9] Since most complaints indicate a bias in favor of hospital programs, it is important to examine whether the criticism is supported by evidence. In this paper we present an analysis of the results of the 1986 NRMP.

Method

The data about the hospital programs and students who participated in the 1986 Match were provided to us by the NRMP with special permission. Unless otherwise stated, "student" is being used as a general term for all the types of applicants: U.S. senior students, U.S. citizens who are graduates of foreign medical schools, and others. In order to keep the data confidential, the students' and hospitals' names were omitted. In addition, the students' and programs' identifications were reformulated so they could

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not be recognized.

The data were organized in three files: the students' ranking file, the hospital programs' ranking file, and the Match result file. The students' ranking file provided ranking information about all the students who participated in the Match. Each record consisted of the student's identification, programs listed by the student, the rank assigned to the student, whether the student was a U.S. senior, whether he or she was part of a couple for matching, and whether the student was active in the Match (that is, did not withdraw from the Match process). Similar information for the hospital programs is found on the hospital programs' ranking file. Each record consisted of the hospital program's identifications, the type of program (specialty), the students listed by the program, the ranks assigned to them, the number of positions offered, and the number of positions filled. The Match result file provided information about all the Match pairs (the programs and the assigned students), the unmatched students, and the unfilled positions.

The analysis consisted of three tasks: (1) To compare the students' and the hospitals' Match successes; (2) to identify factors that affected the hospitals' Match success; and (3) to identify factors that affected the students' Match success.

To compare the students' success with the hospitals' success we calculated the mean value and standard deviation of the program's rank for the matched student and the student's rank for the matched position. Hospital programs have different quotas. Thus, for a student to be ranked as the third candidate by a hospital program that offers only one position is not the same as being ranked third candidate by a hospital program that offers ten positions. Therefore, to make meaningful comparisons, we standardized the rank order by using the following strategy: the rankings submitted by a hospital program were divided into subgroups. The size of each subgroup was equal to the number of positions (quota) offered by that program. Thus, the first subgroup consisted of a number of students — equal to the quota of that hospital program — who were ranked highest on its list. This subgroup was considered the "standardized first choice." Similarly, the students in the second-highest ranking subgroup were considered the "standardized second choice," and so on. For example, if a program's quota were five, the first- to the fifth-ranked students listed by the program would be considered the "standardized first choice" students for its five positions. The sixth- to the tenth-ranked students would be considered the "standardized second choice" students, and so on. Notice that by using this method, we assumed that (1) all the positions offered by a hospital program were identical, and (2) all candidates in each subgroup were equally favorable for all the positions of the hospital program. In other words, if the hospital filled some positions with candidates from the first-choice subgroup, this would be the same as filling one of these positions with a first-choice candidate, and so on.

We calculated the difference between the student's rank and the hospital program's rank (standardized) for each matched pair for the system as a whole (all specialties together) and for each specialty. We employed the *t*-test to find out whether the mean of the rank difference was zero for all specialties as a whole and for each specialty. Finally, we tried to ascertain whether the mean rank differences were affected by the size of the market and/or demand-supply relations for each program specialty. This was done by calculating the corresponding correlation coefficients.

The Match results are different for individual specialties. To identify the factors that affected individual programs' Match successes, we had to analyze the Match results within each specialty. To keep our study manageable, three program specialties were chosen: internal medicine, surgery, and obstetrics-gynecology. These specialties were selected because a large number of positions were offered to students in each of them. Also, as shown later, they represented three different cases: one where the students' success in general was better than the hospital programs' success (internal medicine), one where there was no statistical difference between the students' and the programs' successes (obstetrics-gynecology), and one where programs' success in general was better than students' success (surgery).

In our analysis we used the filling rate and mean of each program's ranking to measure each program's success. The filling rate was defined as the ratio of the number of positions filled to the number of positions offered by a program. The mean of each program's ranking was the average of all the standardized program rank orders assigned to the students who were matched to that program. We concentrated mainly on those factors that were easy to measure and thus could be used most easily in practice to improve future success. We selected three factors as independent variables (possible factors affecting success): (1) the number of candidates listed per position, (2) the number of positions offered, and (3) the mean rank order assigned to the program by students who applied for the program. Pearson correlation coefficients between each program's success measures and the independent variables were calculated and a general linear model and *F*-distribution tests were used to test how these factors affected each program's success.

To identify the variables that affected the students' success, we considered only those students who were U.S. seniors, who applied for only one type of program (specialty), and were not a member of a couple participating in the Match. This subgroup was relatively homogenous and contained the majority of the students (about 70% of all applicants and 85% of all matched applicants). For the reasons previously mentioned, the analysis was carried out only for internal medicine, surgery, and obstetrics-gynecology (about 55% of all positions offered by all specialty programs).

To indicate a student's success or failure to obtain a position, we used a dichotomous variable, where 1 indi-

Table 1

Measurements of Students' and Programs' Successes in the 1986 Match*

Program Specialty†	Positions Filled	A/P Ratio	Measurements‡ MPR Mean	MPR SD	MSR Mean	MSR SD	DIFF Mean	DIFF SD	*p*-value from *t*-Test
Specialties for which students' or programs' success is demonstrated									
Internal medicine	5,985	8.8	3.25	2.74	2.28	2.60	1.24	3.47	.0001
Anesthesiology	280	5.7	2.56	2.21	1.68	3.17	0.88	3.66	.0001
Pediatrics	1,723	9.0	2.95	2.33	2.22	2.05	0.74	2.72	.0001
Family practice	1,960	6.9	2.62	1.80	1.92	1.86	0.70	2.32	.0001
Radiology — diagnostic	390	8.4	2.79	2.08	2.31	1.94	0.47	2.49	.0002
Psychiatry	782	6.1	1.63	1.09	1.43	1.18	0.19	1.40	.0001
Orthopedic surgery	355	15.4	2.01	1.39	2.58	2.76	−0.57	2.76	.0001
Surgery	1,994	9.2	2.23	1.57	3.39	4.12	−1.15	4.06	.0001
Specialties for which students' or programs' success is not demonstrated									
Obstetrics-gynecology	974	11.2	2.76	2.02	2.95	3.71	−0.19	3.82	.1193
Transitional	1,022	7.0	2.44	0.25	2.34	0.16	0.10	0.26	.6577
Emergency medicine	280	11.2	2.18	1.18	2.23	2.05	−0.05	2.08	.6883
Pathology	276	5.7	1.82	1.23	1.78	2.49	0.04	2.58	.8154
Urology	77	1.7	1.04	1.82	1.03	2.67	0.01	2.90	.2854
Physical medicine and rehabilitation	74	8.2	2.00	1.48	2.39	2.87	−0.39	2.99	.2629
Otolaryngology	40	1.4	1.00	—	1.00	—	—	—	—
Neurology	29	1.6	1.10	0.31	1.07	0.37	0.03	0.33	.5728
Neurologic surgery	29	1.5	1.00	—	1.00	—	—	—	—
Ophthalmology	18	2.6	1.22	0.43	1.11	0.47	0.11	0.47	.3313
Radiology — therapeutic	14	4.4	1.29	0.61	1.21	0.58	0.07	0.27	.3356
Plastic surgery	6	16.8	1.17	0.41	1.50	0.84	−0.33	0.82	.3632
Preventive med/public health	5	8.6	1.60	0.89	2.20	1.30	−0.60	1.82	.5012
Dermatology	5	7.9	1.00	—	1.00	—	—	—	—
Overall	16,318	8.5	2.83	2.28	2.34	2.76	0.49	3.28	.0001

*The authors analyzed data provided to them by the National Resident Matching Program to determine whether the students or the hospitals' specialty programs had greater success in the 1986 Match and to identify the factors contributing to the success of each group. The means of the rankings presented in the table (in the MPR and MSR columns) indicate that for six of the eight specialty programs for which a group's success could be shown, the students had greater success than did the programs. (Note: higher ranks — meaning greater success — are shown by smaller numbers.)

†Data about the specialty programs from the 1986 Match are presented here in two groups: the top group comprises those specialty programs for which the mean difference between the program's rank and the student's rank for the matched pairs was found to be significantly different from zero; the bottom group comprises the specialty programs where this difference was not significantly different from zero. In the bottom group, there is no way to ascertain, from the available data, whether one group was more successful than the other for a given specialty program.

‡The column headings are defined as follows: positions filled = number of positions filled in each specialty program; A/P ratio = number of applications per number of positions available; MPR = the mean rank order assigned to matched students by the programs; MSR = the mean rank order assigned to programs by the students; DIFF = the mean difference between the program's rank and the student's rank for the matched pair.

cated a student who was matched to a position and 0 indicated one who was unmatched. The independent variables considered were the number of programs listed by the student and the highest standardized program rank assigned to the student by all programs that listed him or her. Pearson correlation coefficients between the three variables were calculated for the three specialties considered in this study. A general linear model and *F*-distribution tests were used to test the impact of those variables.

Results

In Table 1 we present and compare the measurements of the students' and the programs' successes in the 1986 Match for all the specialty programs considered in the Match process that year. The students' mean rank for the position to which he or she was assigned was 2.34 (SD = 2.76). The programs' mean rank for a student assigned to an available position was 2.83 (SD = 2.28). A *t*-test performed for pair comparison shows that the mean of the rank difference is not zero ($p \leq .0001$). Notice that higher ranks are represented by smaller numbers; thus a smaller mean rank indicates better performance.

For Table 1 the different specialty programs were divided into two groups. The first group includes all programs where the mean difference between the program's rank and the student's rank for the matched pairs was found to be significantly different from zero. The second group includes the specialty programs where this difference was not found to be significantly different from zero. Notice

Table 2

Pearson Correlation Coefficients between Hospitals' Success Variables and Hospitals' Choice Variables, 1986 Match*

Choice Variable†	Success Variables,† by Specialty Program					
	Internal Medicine		Surgery		Obstetrics-Gynecology	
	FIL	MPR	FIL	MPR	FIL	MPR
CPR	.36770	.59637	.40585	.26764	.37676	.33335
Significance level‡	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
MSR	.06070	.18739	.02960	.21945	.02050	.10479
Significance level‡	(.1024)	(.0001)	(.5302)	(.0001)	(.7421)	(.1011)
QUOTA	.14821	−.00357	.10016	−.13264	.26564	−.22379
Significance level‡	(.0001)	(.9250)	(.0321)	(.00600)	(.0001)	(.0004)

*The authors analyzed data provided to them by the National Resident Matching Program to determine whether the students or the hospitals' specialty programs had greater success in the 1986 Match and to identify the factors contributing to the success of each group. The correlations of the data above show that in all three specialty programs, the filling rate (FIL) was affected most by the number of candidates listed per residency (CPR). Program size (QUOTA) seems to have been much less important. The students' evaluation of the program (MSR) does not seem to have affected the filling rate. (See the text for additional interpretations of these data and an evaluation of the explanatory power of the three variables.)

†The variables are defined as follows: FIL = filling rate; MPR = the mean rank order assigned to matched students by the programs; CPR = the number of candidates listed per position; MSR = the mean rank order assigned to programs by the students; QUOTA = the number of positions offered by a program.

‡The numbers in parentheses show the significance level for testing (F-test) such that the coefficient = 0.

that in the first group, the students' success was greater than the programs' in six of the eight specialties. In two specialties (orthopedic surgery and surgery) the programs' success was greater.

Table 1 also contains information about the numbers of positions filled; these numbers can serve as indicators of the size of the market in 1986. We also present data on the ratio of the number of applications to the number of positions available in each program specialty. Notice that since every student could apply to more than one position, the number of applications was greater than the number of applicants (overall, the ratio of active applicants to positions in the 1986 Match was 1.1). We tried to explore whether differences in market size and/or the ability of programs to attract candidates (represented by the ratio of the number of applications to positions) could explain the differences in the mean ranking. No statistically significant relations were found between those variables and mean difference in ranking between matched programs and students.

Table 2 presents the results of our analysis of the three different variables (CPR, QUOTA, and MSR—defined below) that affected the hospital programs' success. An important finding is that in all three specialty programs, the filling rate was affected most by the number of candidates listed per residency position (CPR). This might indicate either the "aspiration level" of accepting a resident or the demand for the program, or both. Program size (QUOTA) seems to have been much less important. The applying students' evaluation of the program, measured by the students' average ranking (MSR), does not seem to have affected the filling rate. It is important to mention, however, that, based on a factor analysis using a general linear model, the explanatory power of these three variables together is about 40% in each of the three specialty programs (R^2 = 0.383, 0.399, 0.392 for internal medicine, surgery, and obstetrics-gynecology, respectively).

The effect of the three variables just mentioned on the hospital programs' satisfaction from the students they received (measured by the average ranks of the students matched—the MPR variable) is also presented in Table 2. Again, the number of students listed per position seems to have been an important variable, but with negative impact. However, it was much more important in the case of internal medicine, less so in the case of obstetrics-gynecology, and even less in the case of surgery. The students' evaluation of the program seems to have affected the programs' satisfaction with the students they received, while the size of the program (QUOTA) does not seem to have had any effect. This is different from the effects of these two variables on the filling rate. Using the same type of analysis, we found that, compared with the former analysis, the three variables presented in Table 2 represent only a smaller portion of the explained variance (R^2 = 0.237, 0.167, 0.251 for internal medicine, surgery, and obstetrics-gynecology, respectively).

The number of programs listed by the student was found to have been an important factor in determining his or her chance to find a position. It is interesting to note that this factor was more important for internal medicine (R^2 = 0.371) and obstetrics-gynecology (R^2 = 0.350) than for surgery (R^2 = 0.183). The evaluation of students by programs was also found to be an important factor, but less so than the variable just discussed in determining the chances of a student to find a position. This factor, like the one previously discussed, was more important for obstetrics-gynecology (R^2 = −0.214) and internal medicine (R^2 = −0.194) than for surgery (R^2 = −0.135). The significance level for rejecting (F = test) such that the coefficient equals zero was 0.0001 in all cases.

Table 3 further illustrates how the number of candidates per position af-

Table 3

Impact of the Number of Candidates Listed per Position (Offered by Internal Medicine Programs) on the Programs' Success in Having All Available Positions Filled by the 1986 Match*

Programs' Filling Rate†	Number of Candidates Listed per Position: 0–2.9	3–5.9	6–8.9	9–11.9	12 or More	Total and % All Programs§
	No., %'s of Programs‡	No., %'s of Programs‡	No., %'s of Programs‡	No., %'s of Programs‡	No., %'s of Programs‡	
0%	20	9	2	1	0	32
	62.5%	28.1%	6.3%	3.1%	0.0%	
	22.7%	4.1%	1.1%	1.0%	0.0%	4.4%
10%	3	3	1	0	0	7
	42.9%	42.9%	14.3%	0.0%	0.0%	
	3.4%	1.4%	0.6%	0.0%	0.0%	1.0%
20%	3	3	0	0	0	6
	50.0%	50.0%	0.0%	0.0%	0.0%	
	3.4%	1.4%	0.0%	0.0%	0.0%	0.8%
30%	15	16	1	3	0	35
	42.9%	45.7%	2.9%	8.6%	0.0%	
	17.1%	7.3%	0.6%	3.1%	0.0%	4.8%
40%	10	7	2	0	0	19
	52.6%	36.8%	10.5%	0.0%	0.0%	
	11.4%	3.2%	1.1%	0.0%	0.0%	2.6%
50%	4	16	7	0	1	28
	14.3%	57.1%	25.0%	0.0%	3.6%	
	4.6%	7.3%	3.9%	0.0%	0.7%	3.8%
60%	2	15	6	0	1	24
	8.3%	62.5%	25.0%	0.0%	4.2%	
	2.3%	6.3%	3.4%	0.0%	0.7%	3.3%
70%	7	11	4	3	0	25
	28.0%	44.0%	16.0%	12.0%	0.0%	
	8.0%	5.0%	2.2%	3.1%	0.0%	3.4%
80%	4	16	10	6	3	39
	10.3%	41.0%	25.6%	15.4%	7.7%	
	4.6%	7.3%	5.6%	6.1%	2.1%	5.3%
90%	5	12	11	5	0	33
	15.1%	36.4%	33.3%	15.0%	0.0%	
	5.7%	5.5%	6.2%	5.1%	0.0%	4.5%
100%	15	112	135	80	140	482
	3.1%	23.2%	28.0%	16.6%	29.1%	
	17.1%	50.9%	75.4%	81.6%	96.6%	66.0%
Total and % all programs‖	88	220	179	98	145	730
	12.1%	30.1%	24.5%	13.4%	19.8%	100.0%

*The authors analyzed data provided to them by the National Resident Matching Program to determine whether the students or the hospitals' specialty programs had greater success in the 1986 Match and to identify factors contributing to the success of each group. This table makes clear the observed trend that the more candidates a hospital listed for a specialty program position, the more likely was the position to be filled.

†The filling rate is the ratio between the number of positions filled and the number of positions offered by a program. In this table the programs are grouped by their filling rates, after these rates were rounded to the nearest 10%.

‡The top value in each group of three values = the number of programs; the middle value = the percentage that this number of programs is of all the programs with the designated filling rate; and the bottom value = the percentage that this number of programs is of all the programs with the designated number of candidates listed per position. For example, in the top left group, there were 20 programs; this was 62.5% of the 32 programs with the filling rate of 0% and was 22.7% of the 88 programs that listed 0–2.9 candidates per position.

§This is the total number of programs for the row (i.e., added horizontally), accompanied by the percentage that this number is of all the internal medicine programs studied.

‖This is the total number of programs for the column (i.e., added vertically), accompanied by the percentage that this number is of all the internal medicine programs studied.

Table 4

Impact of the Number of Choices of Internal Medicine Programs That Students Made on the Students' Success in Being Matched to a Program by the 1986 Match*

Level of Students' Choice Matched	Number of Choices Listed by Students: 1–3	4–6	7–9	10–12	13 or More	Total and % All Students‡
	No., %'s of Students†	No., %'s of Students†	No., %'s of Students†	No., %'s of Students†	No., %'s of Students†	No., %'s
1st	264	414	529	364	606	2,177
	12.1%	19.0%	24.3%	16.7%	27.8%	
	52.9%	66.8%	57.3%	50.8%	47.4%	53.9%
2nd	27	87	188	167	235	704
	3.8%	12.4%	26.7%	23.7%	33.4%	
	5.4%	14.0%	20.4%	23.3%	18.4%	17.4%
3rd	3	46	105	84	183	421
	0.7%	10.9%	24.9%	19.9%	43.5%	
	0.6%	7.4%	11.4%	11.7%	14.3%	10.4%
4th	0	18	43	44	114	219
	0.0%	8.2%	19.6%	20.1%	52.1%	
	0.0%	2.9%	4.7	6.2%	8.9%	5.4%
≥5th	0	7	44	50	131	232
	0.0%	3.0%	19.0%	21.6%	56.5%	
	0.0%	1.1%	4.8%	7.0%	10.2%	5.8%
Unmatched	205	48	15	7	9	284
	72.2%	16.9%	5.3%	2.5%	3.2%	
	41.1%	7.7%	1.6%	1.0%	0.7%	7.0%
Total and % all students§	499	620	924	716	1,278	4,037
	12.4%	15.4%	22.9%	17.7%	31.7%	100.0%

*The authors analyzed data provided to them by the National Resident Matching Program to determine whether the students or the hospitals' specialty programs had greater success in the 1986 Match and to identify factors contributing to the success of each group. This table makes clear the observed trend that the more programs a student chose, the more likely was the student to be matched to a program.

†The top value in each group of three values = the number of students; the middle value = the percentage that this number of students is of all the students whose designated choice was matched; and the bottom value = the percentage that this number of students is of all the students who listed the designated number of program choices. For example, in the top left group, there were 264 students; this was 12.1% of the 2,177 students whose first choice was matched and was 52.9% of the 499 students who listed only one to three program choices.

‡This is the total number of students for the row (i.e., added horizontally), accompanied by the percentage that this number is of all the students who applied for internal medicine residency programs.

§This is the total number of students for the column (i.e., added vertically), accompanied by the percentage that this number is of all the students who applied for internal medicine residency programs.

fects the program's filing rate; here, we present more detailed data for one specialty, internal medicine. It is easy to see that those programs that did not fill any position — 20 out of total of 32 (62.5%) — listed fewer than three candidates per position. The percentage of the programs that filled all positions in each group significantly increased when the number of candidates listed per position increased (from 17.1% for the first group, with fewer than three candidates per position, to 96.6% for the fifth group, with 12 or more candidates per position).

Table 4 further illustrates the impact of the number of choices on the student's match; here we present more detailed data for the case of the U.S. senior students who applied for internal medicine programs only. The table shows that for those students who listed three of fewer choices, 205 out of 499 (41.1%) were unmatched. However, for those students who listed ten choices or more, fewer than 1% were unmatched. It is clear that listing too few choices does involve a high risk of being unmatched, both from the program's side and from the student's side.

Discussion

Our analysis strongly suggests that the actual results of the 1986 Match do not favor programs, a finding that is contrary to the perception of many investigators[5–7] and to the theoretical argument that the algorithm used for the matching process is biased in favor of programs.[4,8] Overall, in our study, the students performed better than did the programs. Furthermore, the analysis of each specialty program shows that in the majority of cases (20 out of 22 cases) the students' performance was better than or at least

as good as that of the programs. The analysis was performed only for the outcome of the 1986 Match; however, we have no reason to believe that 1986 was different from previous or subsequent years. In order to test our conclusion, the same type of data and analysis could be used for the results of the Match in other years.

The NRMP has been praised as an equitable system of residency matching. The two goals of adopting a centralized matching mechanism were to bring order and fairness to a chaotic application process for internship and residency positions. There is general agreement that the first goal was achieved. With respect to the second goal—fairness—the evidence indicates that improvement is still called for. An ideal situation would be that the students' success would be equal to the programs' success and that no "sector" could, through superior analysis of publicly available information, through access to non-publicly-available information, or through any other mechanism, bring about superior performance. This issue is dealt with by the authors in more depth elsewhere.[10]

How else can we improve fairness in the system? Our findings in the present study do not supply the answer. We feel that a promising and practical way to reach this goal is to try to improve the assignment algorithm that is currently used. An example for such an effort to improve the algorithm by using the utility approach is described elsewhere by Mehrez and the present authors.[11]

Finally, we should notice that the matching algorithm, although being optimal in terms of stability,[2] does not guarantee to maximize the number expected to assign a student to a position that is not mutually agreeable, as shown on the rank-order lists of both parties.[12] Every year we find that while some graduates fail to receive their internship positions, there are still vacancies in some hospitals. After the 1986 Match, for example, there were still 2,634 positions (14%) unfilled, and 5,221 graduates (24.4%) did not receive any position. Our analysis of the Match results suggests that for both the programs and students, listing more choices will increase their chances of finding a Match. Those who choose fewer programs could find themselves without a position in spite of their impression (which they might find to be wrong) of being highly ranked by a hospital where they had been interviewed.[7] The impact of the number of choices on the Match rate was also studied elsewhere by using computer simulation.[13] The results were similar to those presented in this paper.

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Variation in Lengths of Training among Residents Enrolled in Pediatrics and Internal Medicine Training Programs

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Abstract—Data were gathered in 1987 from 180 pediatrics and 302 internal medicine residency training programs about (1) the length of vacation provided their residents, (2) time allowed them for absence from work for reasons other than vacation, (3) how many of them during the previous three years had been required to extend their training to make up absences from work, and (4) whether a system was in place to cover their unexpected absences from work. All these variables affect the duration—but not necessarily the quality—of training that residents actually experience. The data show that these variables demonstrated wide ranges that depended on the postgraduate year of training, the discipline, the program size, and the program type (university, university-affiliated, freestanding, or military). The Accreditation Council for Graduate Medical Education, training program directors, and the American Board of Pediatrics and the American Board of Internal Medicine each need to consider these variables in making their respective decisions about accrediting training programs, verifying the clinical competence of trainees, and certifying program graduates. *Acad. Med.* 65(1990):257-266.

It is assumed that physicians in training within various medical disciplines have similar educational experiences in terms of numbers and types of clinical exposures. To this end, the Accreditation Council for Graduate Medical Education (ACGME) sets and applies minimal educational standards for training through residency review committees established for each discipline. In this way, the ACGME accredits each training program periodically, usually every five to seven years. The educational standards applied relate to the program's institutional affiliation, scope of training, curriculum, learning experiences, staff, facilities, and size, and the evaluation procedures used to measure resident and faculty performances. Accreditation is essential for training programs in order to attract trainees wishing to become certified in their medical disciplines. As one of the criteria for certification, the various specialty boards require completion of a specified number of years of training in accredited programs. Training program directors attest to the specialty board that the training of each resident has or has not been completed satisfactorily.

Despite all this effort to set standards, there are differences in the educational experiences provided to residents. These differences depend on (1) the sizes and locations of training programs, which dictate the numbers and types of patients seen, the frequencies of night and weekend call, and the quantity, variety, and quality of faculty available for teaching; and (2) program policies that relate to the durations of training residents actually experience—that is, policies that govern the length of vacation provided each year and the amount of time allowed for absence from work due to sickness and other reasons that the resident is not required to make up through extended training time.

The purpose of the study reported in this article was to investigate how much variation existed in the lengths of the vacations and allowable leaves of absence without required make-up time provided by pediatrics and internal medicine residency training programs in the United States.

Method

In January 1987, an eight-item, one-page questionnaire was sent to the directors of all 657 accredited pediatrics and internal medicine residency training programs located in the United States and listed in the 1986–1987 Directory of Graduate Medical Education Programs.[1] (The questionnaire was not sent to the directors of the 15 listed programs located in Puerto Rico.) The questionnaire queried the directors on (1) whether the program was a university program, a university-affiliated program, a freestanding program, or a program located in a military hospital; (2) the number of residents currently enrolled in each of the four post-graduate years (PGY-1, PGY-2, PGY-3, and PGY-4); (3) the number of weeks of vacation allowed for each level of trainee; (4) the program's policy concerning making up absences from work (excluding vacation); (5) whether records of days absent from work were kept and, if so, who kept them; (6) the numbers of residents who had completed three years of training by June 1984, June 1985, and June 1986 who had had absences from work (excluding vacations) that exceeded three months; (7) the numbers of residents who had completed three years of training by June 1984, June 1985, and June 1986 who had been required to make up time; and (8) whether a resident was regularly scheduled to provide coverage for unexpected house-officer absences from work (a sick-call resident).

Of the 225 pediatrics residency program directors queried, 180 (80%) responded to the initial mailing; 302 of

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Table 1

Numbers and Percentages of 180 Pediatrics and 302 Internal Medicine Residency Programs, by Type and Size, 1987*

	Program Size						Total, by Type	
	Small		Medium		Large			
Program Type	No.	%	No.	%	No.	%	No.	%
Pediatrics								
University	15	16.3	26	28.3	51	55.4	92	51.1
University-affiliated	8	27.6	16	55.2	5	17.2	29	16.1
Freestanding	26	55.3	18	38.3	3	6.4	47	26.1
Military	8	66.7	4	33.3	0	0.0	12	6.7
Total, by size	57	31.7	64	35.6	59	32.8	180	100.0
Internal medicine								
University	4	5.3	15	19.7	57	75.0	76	25.2
University-affiliated	22	33.3	28	42.4	16	24.2	66	21.8
Freestanding	69	46.9	52	35.4	26	17.7	147	48.7
Military	6	46.2	7	53.8	0	0.0	13	4.3
Total, by size	101	33.4	102	33.8	99	32.8	302	100.0

*In January 1987, the authors sent a questionnaire to the directors of all 657 U.S. pediatrics and internal medicine residency programs in order to determine how much variation existed in the lengths of the residents' vacations and allowable leaves of absence without required make-up time. The data above describe the programs that responded.

the 432 internal medicine residency program directors did so (70%). We did not use a second mailing to increase this response rate because it was considered sufficiently high to satisfy the purposes of the study and the percentages of responses from directors of the four program types — university, university-affiliated, freestanding, and military — were essentially the same as the percentages of distribution of those four program types within the total sample for each of the two disciplines studied (see Table 1).

The data were analyzed according to the variables of discipline, program type, and program size, by use of frequency distributions and cross tabulations.

The authors defined the four program types, for each of the two disciplines, as (1) a *university program* — a residency training program conducted primarily by a university department of pediatrics or internal medicine and located in a general hospital, a children's hospital, or a Veterans Administration hospital; (2) a *university-affiliated program* — a residency training program located in a community hospital, a children's hospital, or a Veterans Administration hospital *not* conducted primarily by a university department of pediatrics or internal medicine, but whose residents are recruited and enrolled as students in a university's graduate medical education program; (3) a *freestanding program* — a residency training program located in a community hospital, a children's hospital, or a Veterans Administration hospital that has no affiliation with a university with respect to conducting graduate medical education programs for residents; and (4) a *military program* — a residency training program located in a U.S. Army, Air Force, or Navy hospital that has no affiliation with a university with respect to conducting graduate medical education programs for residents. These groupings differ from those used by the Accreditation Council on Graduate Medical Education (ACGME) when classifying participants in residency training programs by their relationship to a medical school.

There were 35 children's hospitals in the sample — 31 were university programs, one was university-affiliated, and three were freestanding. Thirty (86%) of these hospitals responded to the questionnaire. There were 13 Veterans Administration hospitals in the sample — three were university programs, five were university-affiliated, and five were freestanding. Ten (77%) of these hospitals responded to the questionnaire. Data from the children's and Veterans Administration hospital respondents were included with those of each of the categories of training programs they represented, rather than in separate children's and Veterans Administration hospital categories.

Program size for each of the two disciplines was determined by categorizing the programs that responded into three groups (small, medium-sized, and large) according to the number of residents enrolled. Thus, for the 180 pediatrics programs the numbers of residents enrolled ranged from five to 110. Fifty-seven of the programs had 15 or fewer residents enrolled and were designated small programs, 64 had between 16 and 34 residents enrolled and were designated medium-size programs, and 59 had 35 or more residents enrolled and were designated large programs. (Notice that the numbers of programs in the groups are approximately equal.) For the 302 internal medicine programs, the numbers of residents enrolled ranged from four to 159. A total of 101 of the programs had 26 or fewer residents enrolled (small programs), 102 had between 27 and 46 residents (medium-sized programs), and 99 had 47 or more residents (large programs). Here again, the numbers

of programs in the groups are about the same. Response rates for the three program sizes within the entire sample could not be determined because the numbers of residents enrolled in the programs that did not respond were not known. Table 1 shows the numbers and percentages of responding programs by program type and size.

Results

The data obtained from the responding programs are presented here in terms of the number of residents enrolled, the length of vacations provided to them, the other absences from work allowed to them and experienced by them, and the use of a sick-call resident system to cover them when they were unexpectedly absent from work.

Number of Residents in Training

The residents enrolled in all the responding pediatrics programs during the 1986–87 academic year were fairly evenly distributed among the first three training years (1,734 in PGY-1, 1,642 in PGY-2, and 1,568 in PGY-3), showing no strong tendency towards the "pyramid" effect—that is, significant losses between PGY-1 and PGY-3. There were 218 PGY-4 residents enrolled; 25% of the 180 pediatrics programs had one PGY-4 resident and 26% had two or more.

On the other hand, the responding internal medicine programs enrolled 23% fewer PGY-2 and PGY-3 residents than PGY-1 residents (3,764 from PGY-2 and 3,745 from PGY-3 versus 4,910 from PGY-1). This reflects the enrollment of "transitional-year" residents who enter other, non-internal-medicine, training programs following their first postgraduate year. There were 436 PGY-4 residents enrolled; 23% of the 302 internal medicine programs had one PGY-4 resident, and 34% had two or more.

Table 2 shows (1) the number of residents enrolled in the responding pediatrics and internal medicine programs at al' levels of training, by each program type and size; (2) the per-

Table 2

Numbers and Percentages of Residents Enrolled in 180 Pediatrics and 302 Internal Medicine Programs, by Program Type and Size, 1986–87*

Program Type and Size	No. Programs	No. Residents	% All Residents, by Program Type	% All Residents in All Programs
Pediatrics				
University				
Small	15	177	5.1	3.4
Medium	26	661	19.1	12.8
Large	51	2,616	75.7	50.7
Total	92	3,454	99.9†	66.9
University-affiliated				
Small	8	101	14.0	1.9
Medium	16	387	53.8	7.5
Large	5	231	32.1	4.5
Total	29	719	99.9†	13.9
Freestanding				
Small	26	300	36.3	5.8
Medium	18	380	46.0	7.4
Large	3	146	17.7	2.8
Total	47	826	100.0	16.0
Military				
Small	8	96	58.9	1.9
Medium	4	67	41.1	1.3
Large	0	—	—	—
Total	12	163	100.0	3.2
All programs	180	5,162	—	100.0
Internal medicine				
University				
Small	4	86	1.6	0.7
Medium	15	536	10.2	4.2
Large	57	4,630	88.2	36.0
Total	76	5,252	100.0	40.9
University-affiliated				
Small	22	410	15.7	3.2
Medium	28	1,092	41.8	8.5
Large	16	1,109	42.5	8.6
Total	66	2,611	100.0	20.3
Freestanding				
Small	69	1,261	27.3	9.8
Medium	52	1,818	39.3	14.1
Large	26	1,543	33.4	12.0
Total	147	4,622	100.0	35.9
Military				
Small	6	115	31.1	0.9
Medium	7	255	68.9	2.0
Large	0	—	—	—
Total	13	370	100.0	2.9
All programs	302	12,855	—	100.0

*In January 1987, the authors sent a questionnaire to the directors of all 657 U.S. pediatrics and internal medicine residency programs in order to determine how much variation existed in the lengths of the residents' vacations and allowable leaves of absence without required make-up time. The above data describe the programs that responded.

†This total does not equal 100% because the component percentages were rounded.

Table 3

Numbers and Percentages of 180 Pediatrics and 302 Internal Medicine Residency Programs with Specified Vacation Lengths, by Level of Training and Program Type, 1987*

Program Type for Each Postgraduate Year	No. Programs	Percentage of Programs with Specified Length of Vacation		
		Two Weeks	Three Weeks	Four Weeks
Pediatrics				
PGY-1				
University	92	34.7	32.6	32.6
University-affiliated	29	34.5	34.5	31.0
Freestanding	47	27.8	34.0	38.2†
Military	12	100.0	0.0	0.0
All programs	180	36.7	31.7	31.7
PGY-2				
University	92	7.6	48.9	43.5
University-affiliated	29	3.4	51.7	44.8
Freestanding	47	6.4	48.9	44.6†
Military	12	50.0	16.7	33.3
All programs	180	9.4	47.8	42.8
PGY-3				
University	92	4.3	47.8	47.8
University-affiliated	29	3.4	41.4	55.2
Freestanding	47	6.4	42.6	51.0†
Military	12	33.3	16.7	50.0
All programs	180	6.7	43.9	49.4
Internal medicine				
PGY-1				
University	76	44.7	32.9	22.4
University-affiliated	66	39.4	37.9	22.7
Freestanding	147	40.8	38.1	21.1
Military	13	100.0	0.0	0.0
All programs	302	44.0	35.1	20.9
PGY-2				
University	76	9.2	56.6	34.2
University-affiliated	66	7.6	56.1	36.3
Freestanding	147	12.9	58.5	28.6
Military	13	38.5	38.5	23.0
All programs	302	11.9	56.6	31.5
PGY-3				
University	76	5.3	59.2	35.5
University-affiliated	66	3.0	56.1	40.9
Freestanding	147	10.2	54.4	35.4
Military	13	30.8	23.1	46.1
All programs	302	8.3	54.6	37.1

*In January 1987, the authors sent a questionnaire to the directors of all 657 U.S. pediatrics and internal medicine residency programs in order to determine how much variation existed in the lengths of the residents' vacations and allowable leaves of absence without required make-up time. The above data present the vacation lengths of the programs that responded.

†One medium-sized, freestanding program gave five weeks of vacation in each of the four years of training.

centage of all residents enrolled, by each program type and size; and (3) the percentage of all residents these numbers represent for all the pediatrics and internal medicine residency training programs that responded. Thus, 66.9% of all these pediatrics residents were enrolled in the university programs, while only 40.9% of the internal medicine residents received their training in such programs. Freestanding programs accounted for 35.9% of the internal medicine trainees and 16% of the pediatrics trainees. The university-affiliated programs were lower on the list, accounting for 20.3% of the internal medicine and 13.9% of the pediatrics trainees. The military hospitals trained relatively few residents—approximately 3% for each discipline.

Length of Vacation

The length of vacation that residents received during each of the three years of training varied by their levels of training, their disciplines, and the types and sizes of the programs in which they were enrolled. Tables 3

Table 4

Numbers and Percentages of 180 Pediatrics and 302 Internal Medicine Residency Programs with Specified Vacation Lengths, by Level of Training and Program Size, 1987*

Program Size for Each Postgraduate Year	No. Programs	Percentage of Programs with Specified Length of Vacation		
		Two Weeks	Three Weeks	Four Weeks
Pediatrics				
PGY-1				
Small	57	54.4	21.1	24.5
Medium	64	32.8	31.3	35.9†
Large	59	23.7	42.4	33.9
All programs	180	36.7	31.7	31.7
PGY-2				
Small	57	19.3	49.1	31.6
Medium	64	7.8	43.8	48.4†
Large	59	1.7	50.8	47.5
All programs	180	9.4	47.8	42.8
PGY-3				
Small	57	12.3	50.9	36.8
Medium	64	7.8	34.4	57.8†
Large	59	0	47.5	52.5
All programs	180	6.7	43.9	49.4
Internal medicine				
PGY-1				
Small	101	52.5	41.6	5.9
Medium	102	45.1	33.3	21.6
Large	99	34.3	31.3	34.3
All programs	302	44.0	35.1	20.9
PGY-2				
Small	101	16.8	66.3	16.8
Medium	102	10.8	58.8	30.4
Large	99	8.1	45.5	46.5
All programs	302	11.9	56.6	31.5
PGY-3				
Small	101	9.9	68.3	21.8
Medium	102	8.8	52.9	38.2
Large	99	7.1	42.4	50.5
All programs	302	8.3	56.6	37.1

*In January 1987, the authors sent a questionnaire to the directors of all 657 U.S. pediatrics and internal medicine residency programs in order to determine how much variation existed in the lengths of the residents' vacations and allowable leaves of absence without required make-up time. The above data present the vacation lengths of the programs that responded.

†One medium-sized freestanding program gave five weeks of vacation in each of the four years of training.

and 4 demonstrate these variations. The data presented in the tables show that in general (1) vacation time increased each year; (2) the pediatrics residents got more vacation time at all levels than did the internal medicine residents; (3) the university-affiliated and freestanding pediatrics programs provided more vacation time to their residents than did the university and military pediatrics programs; (4) the university-affiliated internal medicine programs provided more vacation time to their residents than did the other types of internal medicine programs; and (5) the larger the program size, the longer the vacation time provided to residents in both disciplines, except that among the pediatrics programs, the medium-sized ones provided longer vacations during each year of training than did the large ones.

During the 1986–87 academic year, less than half of all the programs in both disciplines provided four weeks of vacation to their residents at any of the levels of training. Indeed, only 37.1% of the internal medicine programs allowed four weeks of vacation for their residents in PGY-3; those in PGY-2 and PGY-1 fared less well (31.5% and 20.9%, respectively). As noted above and shown in Tables 3 and 4, the pediatrics programs were more generous in this respect. At the PGY-4 level of training (not shown in the tables), 57% of the pediatrics and 44% of the internal medicine programs allowed four weeks of vacation. Eight of the pediatrics and six of the internal medicine programs that pro-

vided two to three weeks of vacation for their PGY-2 and PGY-3 residents reported that they allowed them one to two weeks each year to attend medical meetings or for independent study.

Absences from Work

The number of weeks, in addition to vacation time, that the pediatrics and internal medicine training programs allowed their residents to be absent from work because of illness, maternity leave, paternity leave, or family crises (illness, death, or discord) varied considerably by program type and size both within each discipline and between the two disciplines, as shown in Table 5. Only 6.7% of the pediatrics programs and 7.6% of the internal medicine programs allowed no such absences, requiring residents to make up *all* time missed from work. Some programs (17.2% of the pediatrics and 20.5% of the internal medicine programs) had no policy governing these absences. These respondents indicated that absences from work beyond vacation time were allowed without residents' having to make up the time, but that the amount of time allowed depended on (1) the individual circumstances surrounding leaves for sickness, maternity, paternity, or family crisis; (2) the number of consecutive weeks absent from work; (3) the training year during which the absence occurred—that is, absences during the PGY-1 year were more likely to require make-up than those occurring during PGY-2 or PGY-3; (4) the specific service to which the resident was assigned during the absence—that is, absences during intensive care unit assignments were more likely to require make-up than those occurring during other assignments; and (5) the resident's overall performance, with high-performing residents being less likely to be required to make up time away from work than poorly-performing residents.

Of the 180 pediatrics residency programs responding, 127 (70.6%) stated that they kept records of the times residents were absent from work. The university programs were least likely (58.7%) and the military programs most likely (91.7%) to do so. The university-affiliated and the freestanding programs kept such records at rates of 79.3% and 82.9%, respectively. The small and medium-sized programs were most apt to keep such records (77.2% and 78.1%) and the large programs least apt to (55.9%).

Similar distributions for keeping records of residents' absences were reported by the 302 internal medicine programs—71.2% of all the programs, 57.3% of the university programs, 80.3% of the university-affiliated programs, and 77.1% of the freestanding programs. However, only 61.5% of the military programs did so. The small internal medicine programs kept records of residents' absences most frequently (84.8%), while the medium-sized and large programs did so less frequently (65.7% and 64.6%, respectively).

The responsibility for keeping absence-from-work records in the 482 pediatrics and internal medicine programs fell to the program chairman's office (77.2% of all programs), to the chief resident (14.7% of all programs), or to the individual resident (8.1% of all programs). There was little variation in assignments of this responsibility among the disciplines or by program type or size within them. Thirteen of the respondents volunteered that while they kept records of residents' absences, they did so only for absences that exceeded one week.

Of the approximately 4,700 pediatrics residents (enrolled in the 180 responding programs) who were scheduled to complete three years of training on June 30 in 1984, 1985, or 1986, 94 (2%) were required to make up time missed from work. For the same period, 136 (1.7%) of the approximately 8,200 internal medicine residents enrolled in the 302 responding programs were required to do so. Neither the lengths of make-up time required in these instances nor whether this time was taken from unused vacation periods or added onto the end of the three years of training was determined through the questionnaire. There was no tendency in relation to program type or size, or over the three years surveyed, to require make-up time more frequently or less frequently.

There were 57 pediatrics and 63 internal medicine programs that provided 12 weeks of vacation over the three years of training. Of these, 22 pediatrics and 28 internal medicine programs had policies that allowed up to 15 extra weeks of absence from work for other reasons during the three years of training, without requiring make-up. Thus, any illness, maternity, paternity, or family crisis that led to any days away from work in these programs caused their residents to exceed three months of absence from work during the three-year training period. This is the extreme circumstance, but one that must have affected large numbers of residents. Yet only 31 pediatrics and 12 internal medicine residents enrolled in these 50 programs who completed their three years of training at the end of June in 1984, 1985, or 1986 were required to make up time. There surely were many more who were not required to do so, as there must have been among those enrolled in programs that provided less than 12 weeks of vacation, but who were absent from work more than three months overall. They must have numbered many more than the 94 pediatrics and 136 internal medicine residents (of the over 18,000 enrolled annually in all of the responding programs) who were required to make up time either during or following the three years of training that ended on June 30, 1984, 1985, or 1986. Indeed, 28 of the pediatrics and 48 of the internal medicine program directors spontaneously responded that they would allow residents from three weeks to three months of absence from work beyond vacation time during the three years of training without requiring that this time be made up.

The specific issue of the amount of time that each program allowed for

Table 5

Numbers and Percentages of 180 Pediatrics and 302 Internal Medicine Residency Programs with Specified Weeks of Absence Allowed Residents (beyond Vacation Time) during Three Years of Training without Requiring Make-Up Time, by Program Type and Size, 1987*

Program Type and Size	No. Programs	Percentage of Programs with Specified Weeks of Absence Allowed					
		None	1–2	3–4	5–6	7–15	No Policy
Pediatrics							
University							
Small	15	20.0	0.0	6.7	13.3	26.7	33.3
Medium	26	7.7	7.7	15.4	15.4	26.9	26.9
Large	51	7.8	5.9	17.6	13.7	39.2	15.7
All programs	92	9.8	5.4	15.2	14.1	33.7	21.7
University-affiliated							
Small	8	12.5	0.0	12.5	12.5	50.0	12.5
Medium	16	0.0	6.3	31.3	0.0	50.0	12.5
Large	5	0.0	20.0	20.0	0.0	60.0	0.0
All programs	29	3.4	6.9	24.1	3.4	51.7	10.3
Freestanding							
Small	26	0.0	11.5	26.9	15.4	34.6	11.5
Medium	18	5.5	5.5	27.8	16.7	27.8	16.7
Large	3	33.3	0.0	66.7	0.0	0.0	0.0
All programs	47	4.3	8.5	29.8	14.9	29.8	12.8
Military							
Small	8	0.0	25.0	37.5	12.5	12.5	12.5
Medium	4	0.0	0.0	0.0	25.0	50.0	25.0
Large	0	—	—	—	—	—	—
All programs	12	0.0	16.7	25.0	16.7	25.0	16.7
All pediatrics programs	180	6.7	7.2	21.1	12.8	35.0	17.2
Internal medicine							
University							
Small	4	0.0	0.0	25.0	25.0	0.0	50.0
Medium	15	13.3	6.7	13.3	13.3	20.0	33.3
Large	57	12.3	3.5	24.6	8.8	35.1	15.8
All programs	76	11.8	3.9	22.4	10.5	30.3	21.1
University-affiliated							
Small	22	13.6	4.5	18.2	18.2	22.7	22.7
Medium	28	7.1	10.7	21.4	10.7	21.4	28.6
Large	16	0.0	12.5	12.5	12.5	25.0	37.5
All programs	66	7.6	9.1	18.2	13.6	22.7	28.8
Freestanding							
Small	69	13.0	8.7	23.2	8.7	26.1	20.3
Medium	52	0.0	9.6	26.9	17.3	30.8	15.4
Large	26	0.0	0.0	34.6	7.7	42.3	15.4
All programs	147	6.1	7.5	26.5	11.6	30.6	17.7
Military							
Small	6	0.0	33.3	50.0	0.0	16.7	0.0
Medium	7	0.0	14.3	14.3	14.3	42.8	14.3
Large	0	—	—	—	—	—	—
All programs	13	0.0	23.1	30.8	7.7	30.8	7.7
All internal medicine programs	302	7.6	7.6	23.8	11.6	28.8	20.5

*In January 1987, the authors sent a questionnaire to the directors of all 657 U.S. pediatrics and internal medicine residency programs in order to determine how much variation existed in the lengths of the residents' vacations and allowable leaves of absence without required make-up time. The above data present the lengths of the allowable weeks of absence, if any, of the programs that responded.

maternity leave was not addressed in the questionnaire. However, nine program directors commented that they had had one resident over the prior three years who had had to make up time taken away from work because of pregnancy. On the other hand, three program directors commented that their programs allowed between 30 and 60 days (in addition to vacation time) for maternity leave that did not have to be made up. One of these programs also allowed seven days for paternity leave that did not require make-up.

Use of a Sick-Call Resident System

A sick-call resident system provides coverage for residents who are unexpectedly absent from work for any reason.[2] Residents are assigned to this function within the program's schedule, usually while they are on a subspecialty elective. The system ordinarily provides coverage for night and weekend duties, although in some programs week-day assignments are also covered by the sick-call resident. The system is designed to reduce stress among residents who must assume the added work and on-call hours created by a peer's unexpected absence and to reduce stress among the residents who are absent from work—stress caused by the reason for the absence itself and the guilt of adding to their colleagues' already heavy work load.

A sick-call resident system was used in 37 (20.6%) of the 180 responding pediatrics programs. Thirty of the 92 university programs (32.6%), five of the 29 university-affiliated programs (17.2%), two of the 47 freestanding programs (4.3%), and none of the 12 military hospital programs had a sick-call resident system. Large programs were more likely to have such a system (30.5%) than were medium-sized programs (21.9%) or small programs (8.8%).

Of the 302 responding internal medicine programs, 98 (32.5%) had a sick-call resident system. Thirty-two of the 76 university programs (42.7%), 24 of the university-affiliated programs (36.4%), 42 of the 147 freestanding programs (29.2%), and none of the 13 military hospital programs had a sick call resident system. Again, large programs were more likely to have such a system (45.5%) than were medium-sized (34.3%) or small programs (17.8%).

Those pediatrics and internal medicine programs without a sick-call resident system either used the chief resident of hired part-time physicians to cover for residents who were sick or absent from work for other reasons, or had no backup system at all. In the latter instance, the extra work load was assumed by residents assigned to the same service as the absent resident.

Discussion

The data presented in the previous section are discussed in relation to (1) requirements, promulgated by the pediatrics and internal medicine residency review committees of the Accreditation Council for Graduate Medical Education, for accreditation of training programs; (2) training requirements that applicants to the American Board of Pediatrics and the American Board of Internal Medicine must meet for certification; and (3) recent attempts to reduce the stress experienced by pediatrics and internal medicine residents during training.

The special requirements for residency training in pediatrics[3] and in internal medicine[4] generated by their respective residency review committees make no mention of the length of vacation that should be provided residents or of restrictions on leaves of absence for any reason during training. The residency review committee for internal medicine, however, does make specific recommendations regarding work schedules, which were implemented on October 1, 1989. These include (1) being on call every third or fourth night during inpatient rotations and on call no more than every third night, regardless of the assignment; (2) working no more than 80 hours per week, averaged over four weeks; (3) being free of hospital duties at least one day out of seven; and (4) drawing assignments to the emergency department that do not exceed 12 continuous hours and are followed by at least 8 hours off duty. Recommendations 2, 3, and 4 are identical to requirements implemented by the New York State Department of Health on July 1, 1989. New York State's limitation that residents can work no more than 24 consecutive hours in direct patient care activities when assigned to inpatient services is not included among the recommendations of the internal medicine residency review committee. The pediatrics residency review committee currently makes no recommendations to limit residents' work schedules, but one of its revised requirements (effective January 1, 1990) is that "resident on-call rotations should occur with an average frequency of every third or fourth night in any year of the program and the schedule should be designed to provide a monthly average of at least one day out of seven without assigned duties in the program."[3] In a 1985 memorandum, the residency review committee stated, that "absenteeism (illness, maternity leave, etc.) which exceeds three months in three years, excluding approved vacation, could adversely affect the attainment of educational objectives, except in very unusual circumstances."[5]

The American Board of Pediatrics, on the other hand, requires at least 33 months of training for residents. In its booklet of information for applicants it states that "absences in excess of three months, whether for vacation, sick leave, maternity leave, etc., must be made up."[6] Further, the board requires residency program directors, in completing its Verification of Clinical Competence Form for each applicant, "describe any periods of absence from the training program that have not been made up by the applicant. This would include any absences, maternity/paternity leaves or sick leave taken in addition to the vacation and sick leave normally allowed each resident. The Board recommends that absences from a program beyond three months during the three years of training be made up by additional periods of training."[7] If the program director believes that an absence of more than three months is justified and that the candidate is qualified to take the board examination, a letter of explanation can be

sent by the director to the board's credentials committee for review.[8]

The American Board of Internal Medicine makes no statement in its Policies and Procedures booklet that limits the amount of absence from work that residents may be permitted during their three yeas of training.[9] It explains in a November 19, 1984, memorandum to program directors that this reflects a flexible policy of the board concerning acceptable reductions in its training requirements and leaves to the discretion of program directors the length of absences from work that is permitted residents without requiring make-up. Justification of absences greater than one month per year, exclusive of vacation time and acceptable to the board, is expected from the program director.

The American Board of Pediatrics' posture regarding the length of absences from work permitted residents without requiring make-up presents difficulties for both residents and program directors. The data presented in Tables 3 and 4 show that 31.7% of the responding pediatrics programs allowed 12 weeks of vacation during the three years of training; by board criteria, this would allow no time for absences due to illness or maternity, paternity, or family crises without requiring make-up or getting program-director justification for such absences. The weeks of absence allowed without having to be made up by most of the rest of the programs, shown in Table 5, indicate that large numbers of pediatrics residents were not meeting American Board of Pediatrics length-of-training requirements during the period surveyed in this study. If program directors reported all residents' absences from work to the board on its Verification of Clinical Competence Form, most of these residents would be required to extend the length of their training beyond three calendar years. Program costs for resident stipends, fringe benefits, and malpractice insurance would rise appreciably, and residents would be delayed in starting practice or subspecialty fellowship training. It would also interfere with the timing for spouses' training or job placements in other communities. This could explain why only 2% of the pediatrics residents were required to make up time at the end of their training over the three years surveyed.

The stress caused by worrying about having to make up time, in addition to the already high levels of stress residents experience during training, should be of great concern to program directors. Methods for reducing these high levels of stress in pediatrics and internal medicine programs have been recommended by many individuals and groups involved in directing residency training. The most recently published recommendations emphasize the importance of flexibility in scheduling residents' work hours and in allowing adequate vacation time and absence from work when needed for other reasons.[10,11] It is disappointing that so many programs allow their residents only two or three weeks of vacation each year and require invasion of this time to make up for other absences, and that so few programs have implemented a sick-call resident system.

As noted in the introduction to this report, there are many variables that influence the quality of residency training; the amount of time spent at work over the three years of training may be the least of these. The quality of training programs is the focus of residency review committees, and those for pediatrics and internal medicine have focused on the training program's structure (institution and faculty), process (curriculum and clinical experiences), and outcome (success of its trainees on board-certifying examinations) in judging a program's quality. Other outcomes of training, such as the quality of medical care former trainees deliver, are difficult to measure and are influenced by intervening variables not related to the quality of training received. The residency review committees have chosen not to focus on duration of training, except for the number of years spent at it, perhaps recognizing that even this is arbitrary and that the learning gained during one week of training in one program is equal to that gained during two or three weeks in another. Rather, they have depended heavily on program directors to determine when their trainees are ready to "come out."

Nevertheless, the problem of wide variations in the length of training experienced by pediatrics and internal medicine residents and its effect upon the quality of their education and their lives needs to be resolved.

There are no easy solutions. Standardizing vacations to allow four weeks during each year of training would reduce some of the variation in length of training and the levels of stress among residents, but this would be difficult for small programs to implement without increasing the work load of residents not on vacation or without reducing the number of patients covered by the residents. Standardizing the length of absence from work allowed for other reasons (for example, to ten, 20, or 30 days during each year of training or, over the three years, to 30, 60, or 90 days) would present the same advantages and disadvantages. In addition, some program directors, residency review committee members, and specialty board members would be concerned that the overall duration of training for substantial numbers of residents would be shortened at a time when the number of residency review committee–required clinical experiences are increasing, and that some residents would take advantage of the system to maximize their time away from work.

It would seem most appropriate for the boards of pediatrics and of internal medicine to adopt flexible policies that transfer to program directors the responsibility to determine within reasonably broad limits how much time each resident should spend at work during each year of training. However, program directors would have to do this diligently and with the greatest of care and wisdom.

The authors thank the 482 pediatrics and internal medicine residency training program directors who provided the information upon which this report is based.

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Surveying Graduates of Combined Internal Medicine–Pediatrics Residency Programs

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Abstract—Graduates of all U.S. combined internal medicine-pediatrics residency programs were surveyed in 1987 regarding a variety of demographic information about their residencies and current practices, the residency curricula they had followed for both specialties, and recommendations for modifications in training. The 71 responding graduates (from a total of 112) reported patient care as their major involvement (mean of 42.9 hours per week), with a majority (83%) seeing patients in both pediatric and adult age groups. Most were involved in primary care only (64%). The graduates reported that during both pediatrics and internal medicine training, they had had too many inpatient and intensive care rotations and too few elective and ambulatory rotations. The most important subspecialty rotations in internal medicine were considered to be cardiology, dermatology, and pulmonary medicine; and in pediatrics, infectious disease, cardiology, and adolescent medicine. The graduates recommended more outpatient subspecialty rotations, ambulatory rotations in medicine and pediatrics, and a combined medicine-pediatrics continuity clinic. *Acad. Med.* 65(1990):266–271.

In the past decade, combined internal medicine and pediatrics residency training programs (med-ped) have become increasingly common. Originally evolved in the 1960s from a two-year rotating internship,[1] med-ped programs now are often viewed as an alternative to family-practice training. The programs are generally four years in length and divided equally between the two specialties. By virtue of a 20-year-old agreement between the American Board of Pediatrics and the American Board of Internal Medicine, graduates of such residencies are eligible for both board examinations.

In 1980 there were four med-ped programs identified in the National Resident Matching Program (NRMP) Directory, with nine available postgraduate year-one positions. Only 20 physicians had completed the combined residency by that time. By 1988 there were 76 active programs listed by the NRMP.[2] In 1980, the NRMP reported only 20 applications for med-ped programs. By 1987, there were 1,110 applications from American senior medical students, which is comparable to the 1,755 applications in primary care internal medicine in the same year. This is in contrast to 28,941 applications from American students for all categories of internal medicine programs in 1980, which dropped to 27,239 by 1987.[3] Little is known about the careers med-ped graduates actually choose: whether the graduates are academia- or community-based, whether they are primary or subspecialty providers, and how they are involved with various age groups.[4,5] Questions also remain regarding optimal curricula for trainees, how graduates are accepted by their peers in categorical residencies, and how they perceive their competencies in representative clinical situations. In order to address these questions concerning internal medicine–pediatrics training pro-

Portions of these data were presented at the annual meeting of the Society for Pediatric Research, Washington, D.C., on May 5, 1988, and at the annual meeting of the Society of General Internal Medicine, Washington, D.C., on April 29, 1988.

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grams, the investigators performed the first nationwide survey of graduates of such combined residencies; this article is a report of their investigation and what they found.

Method

Through telephones and written inquiries to the directors of all the med-ped programs listed by the NRMP in 1987, the investigators attempted to obtain the addresses of all the graduates of these programs who had completed combined residencies before July 1986. Questionnaires were mailed directly to the 88 graduates of ten of the 16 programs. The directors of the remaining six programs chose to have their offices mail the surveys to their graduates (an additional 24), citing their policies regarding privacy of information to explain why they did not disclose the names and addresses of these graduates. The questionnaire covered several areas: demographics, residency format, suggested modifications of training, and how the residents perceived their competencies in representative clinical situations. A series of clinical vignettes was used to elicit the residents' responses in this last category of the questionnaire.

The demographic data requested were the location of the residency, the year the residency was completed, the graduate's board certification status in internal medicine and pediatrics, whether the graduate's current clinical practice was in primary care, a subspecialty, or both, and whether it was solo or group- or hospital-based, the hours the graduate was involved with patients of different age groups, and his or her various professional activities and fellowship training. Residency format data requested (for both internal medicine and pediatrics components) were the total number of months the resident spent in each department as well as months spent in various rotations (inpatient wards; adult, pediatric, and neonatal intensive care; emergency room; subspecialty electives; primary care and ambulatory care) and whether the graduate felt the time he or she had been involved in each rotation had been too much, too little, or appropriate. A chi-square analysis compared the graduates who reported either too great or too little time spent in a rotation, in order to evaluate trends for each rotation. A Spearman rank correlation coefficient analysis was made to determine the correlation between the total time spent in a rotation and the perceived appropriateness of the duration of involvement in that rotation.

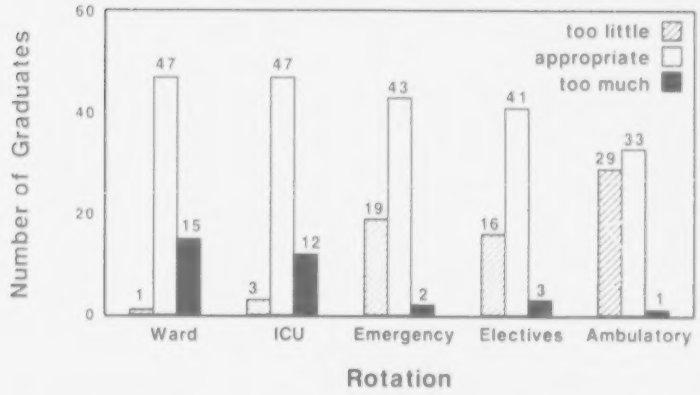

Figure 1. **Clinical rotations in internal medicine: duration and perceived appropriateness of length reported in 1987 by 71 of the 112 graduates of combined internal medicine–pediatrics residency programs.**

The questionnaire listed various subspecialties within each specialty; the graduates were asked to note which of these subspecialties were offered as electives by their residency program, and whether they had completed a particular elective during training. They were asked to rank (from their current perspective) the importance of taking each of the electives, using a Likert-type scale (2 = very important, 1 = somewhat important, and 0 = of very little importance). A contingency table was constructed for comparing the perceived importance scores with whether the rotation was taken. A chi-square analysis was performed, and a contingency coefficient was calculated.

The graduates were asked to note to what degree the internal medicine or the pediatrics housestaff accepted them (very much, somewhat, very little), and asked to outline their continuity clinic experience during the residency. To address whether the combined residency met their expectations, they were asked to report whether they had anticipated, at the beginning of their residency, their current professional activities or practice, or how these activities were different from their expectations. They also were asked to list whether they would again choose a combined residency program. Finally, they were asked to list, in order of priority, recommended changes for med-ped residencies.

Results

Of the 88 graduates from 16 programs mailed surveys directly, 65 (74%) responded. Of the 24 graduates who were to have questionnaires mailed through six other residency programs, six (25%) returned them. The majority of the graduates (and the responding graduates) came from four programs, with by far the largest number of the latter (27) coming from the last year surveyed, 1986. Not all the graduates who filled out the questionniare responded to every question, so that the number of graduates' responses for a particular question may not equal 71.

Internal Medicine Component

During residency training, the responding graduates spent a mean of 24.0 months in internal medicine rotations, with a range of 12 to 30 months. As noted in Figure 1, they had a mean of 10.0 months in inpatient ward rotations, 6.7 months on

elective, 3.7 months in intensive care (ICU), 2.6 months in ambulatory rotations, and 1.8 months in emergency room (ER) rotations. The graduates were more likely to feel there was too much, rather than too little, time on ward and ICU rotations ($p < .001$ and $p < .05$, respectively) and too little time in ER rotations, electives and ambulatory rotations (chi square, $p < .001$, $p < .01$ and $p < .001$, respectively). The graduates noted the amounts of time they spent on various rotations, and their perceptions of the appropriateness of the length of involvement. Except for ward and ambulatory rotations, the graduates who had longer involvements with a given rotation felt a shorter duration would have been more appropriate.

The responding graduates ranked 15 adult subspecialty rotations by perceived importance and by whether they had taken those rotations. The cardiology, dermatology, and pulmonary rotations (in that order) were felt to be the three most important. Of the rotations perceived to be among the more important, dermatology and gynecology are nontraditional internal medicine subspecialties. There was often a significant correlation between the graduates' perceiving a rotation as important and having taken that rotation. However, for dermatology, neurology, rheumatology, ophthalmology, and orthopedics, whether it was taken (or not) did not predict whether it was felt to be important. The graduates also noted rotations considered somewhat or very important that their training program had not offered during residency. These included gynecology (12 respondents) orthopedics (10), psychiatry (7), ophthalmology (6), and allergy-immunology (5).

Pediatrics Component

During training, the responding graduates spent a mean of 23.9 months in pediatrics, with a range of 18 to 30 months. Specifically, they spent a mean of 7.9 months in ward rotations, 5.4 months in the ICU (1.7 pediatrics and 3.7 in neonatal), 1.2 months in the normal newborn nursery, 4.7 months in electives, and 3.5 months in ambulatory care. The graduates tended to feel they had spent too much, rather than too little, time on wards and in the neonatal ICU ($p < .05$, $p < .001$), and too little time in the newborn nursery ($p < .05$), in the ER ($p < .05$), on electives ($p < .001$), and in ambulatory care ($p < .01$) (Figure 2). Significant correlations ($p < .05$) between the length of time spent and the perceived appropriateness of a rotation were present for all rotations except the ward and emergency rotations. Each graduate ranked 12 pediatrics subspecialty rotations by perceived importance, and noted whether he or she had taken a given rotation. Infectious disease, cardiology, and adolescent medicine were felt to be the most important subspecialties. For several rotations, there was a poor correlation between rotations thought to be important and the graduate's having taken them, including pediatric cardiology, endocrinology, hematology-oncology, surgery, and orthopedics. Several of the graduates did not have an opportunity to take selected pediatrics rotations that they had felt to be somewhat or very important during their residencies, including orthopedics (11 graduates), surgery (7), adolescent medicine (5), and gastroenterology (4).

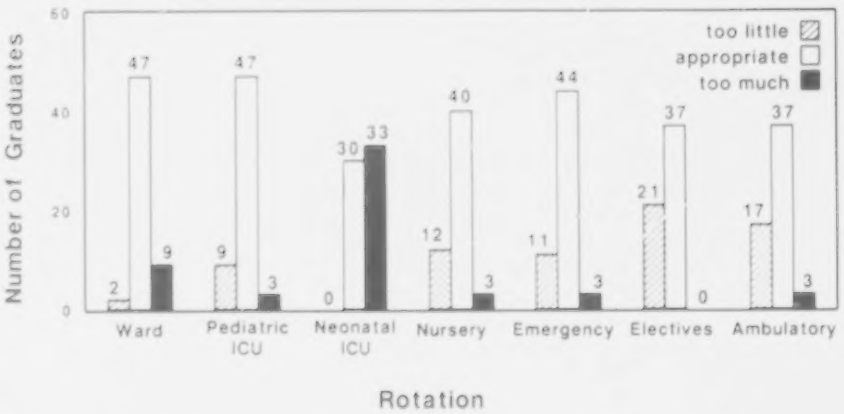

Figure 2. Clinical rotations in pediatrics: duration and perceived appropriateness of length reported in 1987 by 71 of the 112 graduates of combined internal medicine–pediatrics residency programs.

Other Curriculum Issues

The respondents felt very accepted by the traditional house officers during training. Sixty-three reported feeling very accepted by the internal medicine residents (eight reported moderate acceptance, none felt not accepted). Similarly, 60 felt very accepted during training by the pediatrics residents (11 reported moderate acceptance, none felt not accepted).

The majority of the graduates (71%) had separate half-day internal medicine and pediatrics continuity clinic experiences weekly. Some (28%) had attended a weekly combined med-ped clinic, and a smaller number had a continuity clinic once a week that alternated between internal medicine and pediatrics. The graduates reported a mean of 1.8 continuity clinic sessions per week.

Sixty-four of the participants (93% of those who responded to this question) reported they would again choose a combined med-ped residency, and all but one felt the residency met their expectations. When requested to list and rank recommended changes, the graduates most commonly recommended an increase in the amount of time involving outpatient subspecialty rotations, specifically in gynecology, orthopedics, and adolescent medicine (Table 1). How-

ever, the greatest number of graduates ranked as most important that there be an increased amount of time for ambulatory care experiences within internal medicine and pediatrics. Graduates frequently recommended a combined med-ped continuity clinic (31% of those without a combined clinic recommended one). Decreasing the time spent in intensive care (especially the intensive care nursery), addressing administrative concerns, and increasing the preparation for nonmedical aspects of care (including family therapy or financial aspects of health care) were other significant responses of the graduates.

Table 1

Changes in Training Recommended by Graduates of All U.S. Combined Internal Medicine–Pediatrics Residency Programs, 1987*

Recommendation	Number of Graduates Who Listed the Recommendation	Number of Graduates Who Ranked the Recommendation as Most Important
Increase time in outpatient subspecialty rotation†	23	10
Decrease time in intensive care	18	10
Increase/intensify ambulatory care experience	17	13
Offer combined internal medicine–pediatrics continuity clinic	15	8
Establish more defined curriculum, have a designated program director, greater identification as a program, regular seminars, and more recreational activities	14	6
Address administrative issues, have greater flexibility or cooperation between internal medicine and pediatrics programs	9	2
Make available career counseling and information about financial aspects of practice, psychosocial aspects of care, and methods of family therapy	5	—

*The 112 graduates of all programs of this type were surveyed in 1987 regarding information about their residencies, their current practices, and recommendations for changes in the training of residents in such combined programs. A total of 71 graduates responded to the questionnaire.

†Of the number of graduates who listed this recommendation, six were referring to gynecology rotations, six to orthopedics, four to adolescent medicine, and the other seven to rotations in various other specialties.

Current Activities

Fifty-five of the graduates had already received certification in internal medicine, 60 had passed the written portion of the pediatrics examination, and 34 had passed the oral portion (37 of the respondents had graduated too recently to be eligible for the oral portion). Twenty-three of the graduates had pursued fellowship training and one had completed a second residency in preventive medicine. The fellowships included three in infectious diseases and two each in adolescent medicine, gastroenterology, cardiology, general pediatrics, pediatric pulmonology, neonatology, and the Robert Wood Johnson Clinical Scholars program. There was one fellow each in rheumatology, oncology, hematology, pediatric hematology-oncology, general medicine, and behavioral pediatrics. Twelve of the fellowships combined training in treating both child and adult populations.

The respondents reported a mean of 42.9 hours per week of clinical work; and 83% were seeing patients in both child and adult age groups. The mean distribution of hours spent in the different age groups was 4.9 for newborns, 5.1 for toddlers, 4.9 for school-aged children, 4.9 for teenagers, 7.0 for young adults, 9.3 for the middle-aged, and 6.8 for the elderly. Although the graduates spent most of their time in patient care (42.9 hours), they also noted significant time in research (7.0 hours), teaching (5.8 hours), and administration (3.0 hours). Many practiced in a group setting. The majority were involved in primary care only (64%), with an additional 16% in subspecialty care only.

When asked if their current activity were the same as that anticipated from the start of their residency, 39 of the 71 (55%) replied no. Approximately half of those who said no reported that they either had anticipated a career in primary care (16) or had not planned their current career in academic medicine (3). Although a majority of the graduates were able to practice in a combined med-ped setting, 11 reported that they had not been able to; five of these were not practicing pediatrics, three were not practicing internal medicine, and three were practicing both internal medicine and pediatrics but were unable to integrate the two specialties at a single practice setting.

Discussion

This first nationwide survey of graduates of combined medicine and pediatrics residency programs has shown that although these graduates were generally satisfied with their training, they had several specific criticisms of their curricula. During both their internal medicine and their pediatrics training time, the responding graduates would have preferred more ambulatory care and less inpatient experience. There was an especially negative response toward the neonatal intensive care unit. This is not surprising, given the disproportionate amount of time devoted to this area in most pediatrics programs. Indeed, in

the mid-1970s, the American Academy of Pediatrics reported that almost half of their surveyed membership thought they had had too much newborn care training during their residencies.[6] Despite recommendations at that point to limit such exposure, a 1984 survey showed little change in the number of months that pediatrics residents devoted to the area of newborn care.[7]

The graduates generally wanted to have had more ambulatory care time, including primary care, emergency care, and subspecialty electives. Those outpatient specialty experiences that were especially desired were gynecology, orthopedics, and adolescent medicine. These findings are in accord with other published studies of graduates in internal medicine residencies, which show that the graduates consistently want more training in common ambulatory care problems and in subspecialty ambulatory care.[8] Practitioners of general medicine who have trained in either traditional or primary care medicine programs feel underprepared in such "nonmedical" disciplines as orthopedics, dermatology, psychosocial problems, and gynecology.[8–12] Adolescent medicine, however, stands out as a part of training that many med-ped graduates desired. Because of their exposure to both children and adults, some med-ped physicians may see practicing adolescent medicine as particularly appropriate, and it is possible that other physicians would see them as the best consultants concerning this crossover age group. Without directed training in the unique morbidities and developmental issues of adolescence, however, a med-ped physician may be more qualified to treat these patients than any other primary care physician.

The desire of the med-ped graduates surveyed in this study to have more ambulatory education is in agreement with the general trend in medical education away from the hospital ward and toward the outpatient setting, an ever-expanding site of patient management.[13] Even graduates of traditional, subspecialty-oriented internal medicine programs desired increased training emphasis in areas most applicable to outpatient care.[10]

One part of a trainee's primary care experience in an ambulatory care setting is the continuity clinic, an experience that residents, at least in internal medicine, have not always found to be of high quality.[9] In med-ped programs, many different combinations of weekly or semiweekly internal medicine, pediatrics, or combined practices exist. Those who did not experience a combined med-ped continuity clinic often recommended a change to this arrangement that would allow residents to train to see patients of all ages in a single session. Doing this is important because establishing a practice that combines all age groups in a goal anticipated by almost all med-ped residents.

While there was usually a correlation between graduates' having taken a particular subspecialty and their perceiving that the rotation in that subspecialty was important, five medicine and five pediatrics subspecialties were an exception to this trend. In eight of these ten cases, the lack of correlation was a result of the fact that even those who did not take the particular rotation deemed it important. The implication is that med-ped graduates, like internal medicine graduates, wish for exposure to more subspecialty areas without sacrificing the ones they have.[8] As Linn and colleagues[8] note, "This phenomenon of wanting more without an expressed willingness to make cuts elsewhere proves a continuing dilemma to medical educators who try to be responsive to the increasing and often changing needs of residents." In the case of med-ped programs, one way of offering more subspecialty experiences without consuming more valuable time is to offer combined subspecialty rotations for fields such an endocrinology, rheumatology, infectious disease, gastroenterology, and nephrology.

From these data one can first conclude that med-ped training is flexible, allowing either academic or community practice and either general or subspecialty care. Of the 71 graduates who responded, 23 had already pursued fellowship training, and more than half of these fellowships were for a combined med-ped population of patients. The ability to practice a subspecialty in both internal medicine and pediatrics areas is well established for those trained in med-ped. Further, the graduates studied have generally been successful in maintaining practices that involve both adult and pre-adult patients; 83% of the graduates saw patients of all ages. The versatility of training is further supported by board certification performance. Passing rates for med-ped graduates taking the pediatrics and internal medicine board exams are at least as high as those of their counterparts in each of these specialties.[5] Although this may not be an accurate indicator of one's ability to practice both internal medicine and pediatrics, it does establish comparable performance between combined-specialty and non-combined-specialty residents in this one measurement of cognitive skill.

What is implied in the diversity of graduates' careers is that the different med-ped residency programs have different strengths. Some programs are more oriented toward primary care and some more oriented toward their graduates' pursuing subspecialties or other academic pathways. This has been reflected in the opinion of directors of such programs.[14] It may be important, therefore, for each med-ped program to develop and explicitly state its focus. This would not only assist each program to define and nurture its own strengths, but would also help prospective residents to choose the programs that most nearly fit their needs.

There are several possible shortcomings to the present study. By attempting to poll all med-ped graduates as of July 1986 through contact with programs listed in the 1986–1987 *Directory of Residency Training Programs*, the investigators probably omitted some because there have been graduates either of programs that no longer exist or of ad hoc programs not recognized by the NRMP. These potential omissions probably represent a small portion of the total

population of graduates. Moreover, from the standpoint of introducing curricular innovation into med-ped training, it is more valuable to solicit feedback from graduates of currently functioning programs, as has been done. The difference in response rates between those graduates mailed questionnaires directly and those mailed questionnaires indirectly through program directors is probably because some directors of their staffs did not forward the questionnaire. However, there does not appear to be any systematic bias introduced into the results because of this problem.

The interpretation of results form this survey must also be tempered by the knowledge that med-ped programs are rapidly expanding and thus information will be changing rapidly. Although the oldest programs graduated residents more than 15 years ago, the majority of graduates who responded (38 of 71) had finished training in 1985 and 1986; 27 finished in 1986 alone. Therefore, such data as board certification rates, the proportion of graduates ultimately pursuing fellowships, and practice patterns, all of which may take several years to stabilize, are by necessity preliminary. The proportion of residents pursuing primary care careers, for instance, may change over time. The program with the greatest number of graduates to date (the University of North Carolina at Chapel Hill) has produced proportionally more academicians and subspecialists, whereas the second largest (the University of Rochester School of Medicine and Dentistry) has a larger proportion entering primary care.[1] Most of the newer programs tend to emphasize primary care training, and over time will probably account for a growing share of graduates. A disturbing trend emerging at some centers, as found by Siegel and colleagues,[14] is the establishing of a med-ped program in order to strengthen a relatively weak internal medicine or pediatrics program. If this trend continues, it may lead to less success for med-ped graduates in board certification scores and in the ability to sustain combined practices and obtain quality fellowships.

Further research is needed to address these questions now that the rapid growth of numbers of graduates has begun to level off.[2] Although graduates are a valuable source of data, faculty and current trainees may offer complementary information regarding curricular issues. In addition, a major question only hinted at by the present survey is the recent rapid growth of med-ped programs. Med-ped program directors (a small minority of whom were trained in med-ped) most commonly view this combined training as an alternative primary care pathway to family medicine.[14] It is unclear how graduates, current residents, or fourth-year medical students view this issue.

In conclusion, med-ped training has undergone tremendous expansion, approaching, in the mid 1980s, the number of applications to residency programs in primary care internal medicine. Although graduates of med-ped programs have generally been satisfied with their training and successful in their careers, they have certain criticisms of their residency curricula. Their most important recommendation are (1) to limit the required amount of newborn care (especially neonatal ICU), perhaps to one-sixth of all pediatrics time; (2) to emphasize opportunities for ambulatory care training and offer nontraditional outpatient subspecialty rotations such as orthopedics and gynecology, combined med-ped continuity clinics, and adolescent medicine training; and (3) to offer combined rotations in those subspecialties that are more outpatient-oriented and less procedure-oriented.

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AAMC DATA REPORT

Women on Faculties of U.S. Medical Schools, 1978–1989

In the 11 years between 1978 and 1989, the number of women faculty members in U.S. medical schools increased 76%, compared with a 25% increase of men faculty (Table 1). But women faculty still comprise only 20% of the total full-time faculty, up from 15% in 1978 and 18% in 1985. The growth has been greater among women with M.D. and M.D.-Ph.D. degrees than among women with Ph.D. or other doctorate degrees in health (such as public health, dental medicine and surgery, and veterinary medicine). There has been a larger percentage growth in men with Ph.D. degrees than in those with M.D. degrees. The numbers and proportions of both men and women faculty with "other" (predominately master's) degrees have declined.

The percentage of minority women on faculties changed little over the 11-year period, remaining close to the proportions shown in Figure 1 (page 278). However, the rate of increase in the number of minority women was greater than that for white women faculty, and women also tended to be a larger proportion of the minority faculty than the white faculty (Figure 2).

Although the numbers of women in all faculty ranks grew, the increase was greatest among women assistant professors (140%), and 49% of women faculty members now hold this rank (Table 2). Only 29% were at the associate professor or professor levels, compared with 57% of men. Although proportionately more women than men graduates of medical school become full-time faculty members,[1,2] the fact that only about a third of the graduates are women curtails the total number of women entering faculties. Indeed, since 1985 the proportion of women at the associate professor level has not grown, and that of those at the level of professor has dropped slightly.

As Figure 3 shows, the numbers of women in all medical school departments increased significantly. The percentage increases were far from uniform; and in pediatrics, which has a far higher representation of women than any other specialty, the percentage of women actually declined slightly.

While these data show that the number of women on U.S. medical school faculties continues to grow, there remains wide variation in their proportions across academic departments. Better understanding of the lag in progression of women to associate professor and professor ranks probably will not emerge until schools begin to examine their promotion requirements and the guidance and career development of their faculty women. (All data for this report are from the AAMC's Faculty Roster, which contains information on most full-time faculty at U.S. medical schools.)

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Table 1

Distribution of U.S. Medical School Faculty by Degrees and Gender in 1978 and 1989

	1978				1989			
	Men		Women		Men		Women	
	No.	%	No.	%	No.	%	No.	%
M.D. and M.D.-Ph.D.	27,708	69	3,174	44	34,894	69	6,859	54
Ph.D., and other health doctorates	9,696	24	1,916	27	13,530	27	3,897	31
Other degrees	2,583	6	2,063	29	1,607	3	1,857	15
Total	39,987	100	7,153	100	50,031	100	12,613	100
Women as % of total				15				20

Table 2

Numbers and Percentages of Women Faculty by Rank

	1978		1985		1989	
Rank	No.	%	No.	%	No.	%
Professor	518	7	892	10	1,170	9
Associate professor	1,123	16	1,867	20	2,455	20
Assistant professor	2,597	36	4,402	47	6,222	49
Instructor	1,542	22	1,746	19	2,244	18
Other	469	7	381	4	507	4
Missing	904	13	—	—	15	0
Total	7,153	100	9,288	100	12,613	100

Figure 1. Race-ethnicity of women faculty in U.S. medical schools, 1989.

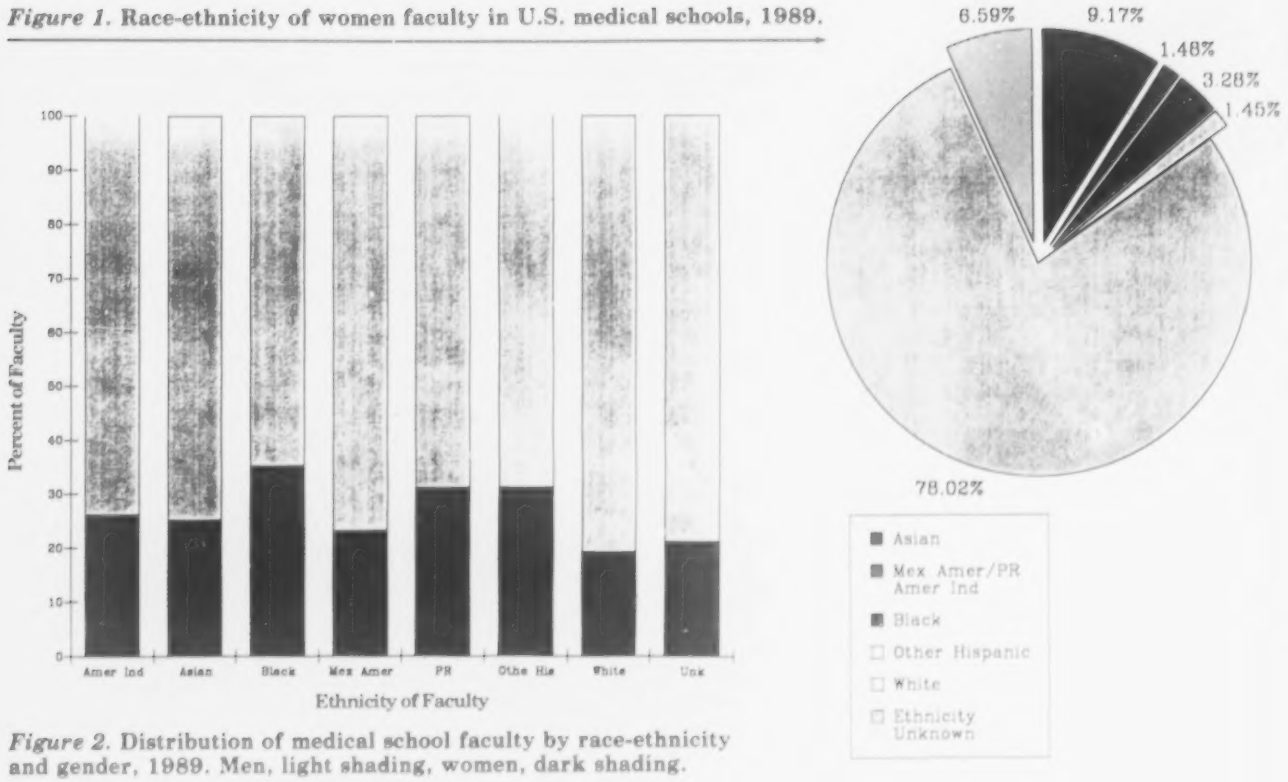

Figure 2. Distribution of medical school faculty by race-ethnicity and gender, 1989. Men, light shading, women, dark shading.

Figure 3. Number of women and percentage of total faculty, by department, in U.S. medical schools, 1978 (light shading) and 1989 (dark shading).